CONSOLIDATED STANDARD REVIEW REPORT

ECONOMICS AND TECHNOLOGY DIVISION

P-89-0867

ICB STANDARD REVIEW SUMMARY: PMN: 87-0867

CHEMIST: M. J. Doa
[redacted]

DATE: 14 August, 1989
SUBMITTER: [redacted]
PRODUCTION VOLUME: [redacted]
CHEMICAL: [redacted]

[redacted]

CHEMICAL ASPECTS OF EXPOSURE/RELEASE:

CAS NO.:	[redacted]
Molecular Formula:	[redacted]
Molecular Weight:	[redacted]
Melting Point:	[redacted]
Vapor Pressure:	[redacted]
Water Solubility:	[redacted]
Log P:	[redacted]

[1]Measured by the submitter [2]Estimated based on analogs

USE: The PMN substance is to be used as [redacted] plastics ([redacted]), [redacted]

OTHER USES: The PMN substance is a substitute for decabromodiphenyl ether and is expected to be used in the same substrates. These uses include polyesters, ABS, PVC, nylon, polycarbonates, polyurethanes, and epoxides.

TECHNICAL CONSIDERATIONS FOR INTENDED USE:

The PMN substance is synthesized by treating 1,2-diphenylethane with bromine in the presence of aluminum chloride.

The PMN substance is very similar to decabromodiphenyl ether. The latter contains [redacted] by weight; the PMN substance contains [redacted] by weight. The physical chemical properities of both are similar, i.e., melting points greater than [redacted]°C, and very low vapor pressures at [redacted]°C. The PMN substance is incorporated into polymers during the thermal molding process or just physically blended in. Approximately [redacted]% of the PMN substance together with [redacted] of [redacted] are added to plastic products. In fiber or fabric coatings (polyester or polyester/coton blends) suspensions containing [redacted] may be used. [redacted] is a synergist at one-half weight of the brominated flame retardant.

Brominated flame retardants function in the gas phase as radical traps, thus interfering with the mechanism of the burning reaction. Thermal degradation of the flame retardant generates HBr, which can rapidly react with hydroxy radicals present, resulting in the formation of water and a bromine radical. This reaction results in the reduction of OH radicals for the highly exothermic reaction with CO which occurs in the propagation step. The bromine radical formed can generate HBr by abstracting a hydrogen radical from a component of the fuel.

There are some advantages in using the PMN substance as a substitute for decabromodiphenyl ether. One of the main advantages of the PMN substance is that pyrolysis can not yield polybrominated dibenzofurans or polybrominated dioxins. Instead, pyrolysis should yield the brominated dihydrophenanthrene (Fig. 1) and the ether (Fig. 2). Decabromodiphenyl ether photolyses to give lesser brominated congeners and brominated dibenzofurans. Photolysis of the PMN substance in the absence of water will give the brominated dihydrophenanthrene (Fig. 1) as well as the lesser brominated congeners.

Dioxins, which are potentially generated via pyrolysis from decabromodiphenyl ether, are planar. The compound which is generated by incorporation of oxygen (by pyrolysis) into decabromodiphenyl ethane is not planar. The seven membered ring takes a bent conformation similar to a v. The seven membered is energetically less favorable than the corresponding six memebered ring. This should not hamper formation of the molecule.

Decabromodiphenyl ethane also should undergo photolysis in water. Photohydroxylation in which bromine is replaced by hydroxyl is the favored route, yielding phenolic derivatives. The degradation products decompose rapidly via increased UV absorption, due to the hydroxyl groups, resulting ultimately in the rupture of the aromatic rings. There have not been any studies which have

investigated the photolysis of decabromdiphenyl ethane or -ether in water and the distribution of the resultant hydroxylation products.

IMPURITIES: [redacted]

Fig. 1

Fig. 2

Economic Report on PMN 89-867

Prepared for:

Jerry Newsome

Regulatory Impacts Branch

Office of Toxic Substances

Office of Pesticides and Toxic Substances

U.S. Environmental Protection Agency

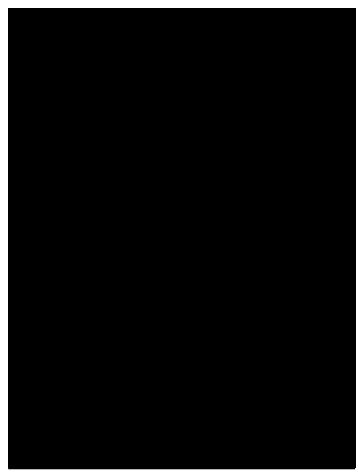
Submitted by:

Steven Forsythe

Kearney/Centaur Division

A.T. Kearney/Centaur Division

A.T. Kearney, Inc.



August 10, 1989

Economic Report on PMN 89-867

Reviewer: Jerry Newsome

Regulatory Impacts Branch

Economics and Technology Division

Submitter: [redacted]

[redacted]

Chemical Name: [redacted]

[redacted]

Chemical Structure:

[redacted]

Generic Name: Halogenated Alkyl Aromatic

Synonym: [redacted]

Trade Identification: [redacted]

Benefits:

The PMN substance apparently provides advantages over alternative fire retardant substances. Plastics and textiles manufactured with the PMN substance demonstrate increased ultraviolet light stability, which is not currently available among some other flame retardants. Additionally, the PMN substance has been shown not to release dibenzofurans or dioxins when used in the manufacture of textiles. Studies performed by the Consumer Product Safety Commision lack sufficient data to make conclusions on the toxicity of other flame-retardants used in textiles like antiblaze 19/19T, decabromodiphenyl oxide, tetrakis(hydroxymethyl)phosphonium salts, other fyrols, pyrons, pyrovatex 3387, tetrabromphthalic anhydride, and antimony trioxide (Clinical Toxicology, 1980).

The submitter is attempting to expand its market share by supplementing and replacing one of its own products ([redacted] with the PMN substance. Currently the submitter receives [redacted] percent of its fire retardant revenues from the production of [redacted] (Skeist Laboratories, Inc., 1985). The predominant use for the PMN substance will be as a flame retardant additive in high impact polystyrene. The submitter did not identify any advantage in processing associated with the PMN substance. However, it appears that the numerous citations of health effects associated with [redacted] and various other flame retardants has created concerns among plastic formulators (Plastics Engineering, 1987).

[redacted]

Substitutes:

Halogens such as chlorine and bromine are frequently used to modify the burning properties of synthetic resins (Kirk-Othmer, 1980). Brominated chemicals have been used as a flame retardant in various products, but its main use as a flame retardant has been in the manufacture of plastics. U.S. consumption of fire retardant brominated compounds is expected to reach [redacted] metric tons in 1989 (U.S. production volume is estimated at [redacted] metric tons in 1989) (SRI International, 1987). The five chemical corporations which manufacture brominated flame retardants are [redacted] (SRI International, 1985). The two largest companies are [redacted] with each comprising approximately [redacted] percent of the brominated fire retardant market. The most common brominated compounds used as fire retardants in plastics include decabromodiphenyloxide, pentrabromodiphenyloxide, octabromodiphenyloxide, brominated styrenes, and tetrabromobisphenol A. The 1987 prices for these products are provided below.

Prices for Flame Retardant Brominated Compounds - 1987 ($/kg)

Decabromodiphenyloxide	$2.86 - $3.42
Pentabromodiphenyloxide	$3.10
Octabromodiphenyloxide	$3.10
Brominated styrenes	$4.85
Tetrabromobisphenol A	$2.50 - $2.64

Source: SRI International, 1987

[redacted]

The PMN substance is most likely to be used as a replacement for [redacted] ([redacted] (see PMN submission). [redacted] which accounts for [redacted] percent of the non-reactive brominated fire-retardant chemical market, is used predominantly as an additive in high impact polystyrene (HIPS) (Skeist Laboratories, 1985). Fire retardants are most frequently added in the fabrication of HIPS when manufacturing television cabinets (Skeist Laboratories, Inc. 1985). The only two companies to make [redacted] are [redacted] each of which supplies about half of the market (SRI International, 1987).

Production Volume:

The production of all flame retardants is estimated to be [redacted] metric tons (about [redacted] million lbs) in 1989 (assuming a [redacted] annual growth from 1986) (SRI International, 1987). It was estimated that the production of brominated flame retardants was [redacted] metric tons (about 83.6 million lbs) amounting to sales of $124 million in 1989 (assuming a 4.5% growth from 1986) (SRI International, 1987). Of the [redacted] metric tons, it is estimated that [redacted] metric tons are attributable to decabromodiphenlyoxide (Skeist Laboratories, 1985).

An analysis of the TSCA PMN database identified [redacted] previous PMNs for flame retardant additives. The first year production volumes range from [redacted] to [redacted] kg., with an average of [redacted] kg. The third year production volumes ranged from [redacted] to [redacted] kg., with an average of [redacted] kg. The production estimates provided by Ethyl Corporation [redacted]

in the first year and [redacted] kg. in the third year) appear to be relatively consistent with the average production estimates provided in other PMN submissions.

The PMN submitter estimated that [redacted] kg. (about 207 metric tons) would be produced during the first year of operation, with [redacted] of this amount going into flame retardants for plastics. Therefore, [redacted] expects to capture less than 1 percent of the brominated flame retardant market in the first year of production. A third year estimate of 2,730,000 kg. (about 1,241 metric tons) is substantially larger than the first year estimate, but still accounts for only 3 percent of the current market. Given that [redacted] already has a large client base, this degree of market penetration seems reasonable, but it is unknown what portion may be coming from its existing market share.

The PMN submitter also estimates that [redacted] percent of the product will go be used as a flame retardant for non-consumer textiles. This amounts to [redacted] kg. in the first year and [redacted] kg. in the third year. The use of brominated fire retardants in textiles is [redacted] kg. (SRI International, 1987). Thus [redacted] expects to only capture [redacted] of the market in the first year and [redacted] of the market in the third year. These estimates appear to be reasonable estimates of the companies ability to penetrate the fire retardant market in non-consumer textiles.

[redacted]

References

Clinical Toxicology. "Flame Retardant Chemicals in Textiles." 17(1): 1980.

Kirk Othmer 1980. Kirk Othmer Encyclopedia of Chemical Technology. Third Edition. Vol. 10. New York: John Wiley & Sons.

Plastics Engineering. "Issues Challenge Flame Retardancy Industry." October 1987.

Skeist Laboratories, Inc. Fire Retardant Plastics: A Multiple-Client Study. May, 1985.

SRI International. Chemical Economics Handbook. Menlo Park, California. June 1985.

SRI International. Specialty Chemicals. Menlo Park, California. October, 1987.

Standard Review Engineering Report
Worker Exposure and Environmental Release Analysis
PMN 89 - 867

Lisa M. Lambrecht
Chemical Engineering Branch
August 9, 1989

I. Introduction

PMN 89 - 867 is a submission from [redacted] for [redacted] a flame retardant for plastics, textiles, and adhesives. The estimated maximum production volume for the chemical is [redacted] kg/yr.

II. Manufacture

A. Process Description

[redacted]

B. Worker Exposure

During manufacture, workers may be exposed during process operation, quality control sampling, packaging, and maintenance. Up to [redacted] workers may be exposed to the PMN chemical. The

manufacturer states that workers will wear disposable coveralls, eye goggles, and respirators. Engineering controls, such as fume hoods, will be used in the bagging and drumming areas to reduce exposure. Workers will not wear gloves but instead will use protective barrier creams due to the problem of the PMN caking inside the gloves and causing abrasion to the hands.

Based on monitoring data for a similar chemical being manufactured by the company using the same equipment, inhalation exposure is not expected to exceed [redacted] mg/day for the [redacted] packaging and maintenance workers and [redacted] mg/day for the [redacted] process operators. Inhalation exposure for the quality control personnel is negligible.

In addition, if no gloves are worn or protective barrier creams used, dermal exposure is expected to range up to [redacted] mg/day for [redacted] workers.

C. Environmental Release

Air emissions of [redacted] kg/site/day over [redacted] days/yr are expected from the grinding and packaging operations. Disposal of [redacted] kg/yr of PMN chemical from dust in the packaging operation will be to an onsite landfill at the manufacturing facility. Water from process operations and equipment cleaning will be filtered prior to deep well injection. This procedure, along with the insolubility of the PMN chemical, will limit the amount of PMN chemical released to about [redacted] ppb/site/day over [redacted] days/yr.

III. Processing

A. Process Description #1

[redacted] The PMN chemical will be transferred from [redacted] Plastic resin and other chemicals are added and the mix is then extruded, pelletized, and drummed. Operations are carried out in and essentially closed system. The final formulation will contain 3 - [redacted] PMN chemical. After processing, the PMN chemical will be totally encapsulated in a polymer matrix. Processing will occur over [redacted] days/week, [redacted] shifts/day for [redacted] days/yr.

B. Worker Exposure #1

A total of [redacted] workers may be involved in processing but only [redacted] of these workers may potentially be exposed to the PMN chemical during weighing and transfers. The protective equipment/controls which the workers will use is unknown.

Based on the OSHA nuisance dust standard, inhalation exposure for the PMN chemical is estimated to be [redacted] mg/day for [redacted] workers.

In addition, if no gloves are worn, dermal exposure may range from [redacted] mg/day for [redacted] workers.

C. Environmental Release #1

CEB estimates that [redacted] kg/yr of PMN chemical

encapsulated in plastic will be landfilled.

D. Process Description #2

Five percent of the production volume [redacted] kg/yr) will be used as a flame retardant for nonconsumer textiles, nonconsumer adhesives, and miscellaneous flame retardant applications. Processing will occur at 5 - 10 sites. The PMN chemical will be transferred into a mixing vessel or hopper and blended with various materials and dispersing agents to form a water dispersion. The final formulation will contain [redacted] PMN chemical. Processing will occur over [redacted] days/wk, three shifts/day for [redacted] days/yr.

E. Worker Exposure #2

A total of [redacted] workers may be involved in processing but only [redacted] of these workers may potentially exposed to the PMN chemical during weighing and transfers. The protective equipment/controls which the workers will use is unknown.

Based on the OSHA nuisance dust standard, inhalation exposure for the PMN chemical is expected to be [redacted] mg/day for [redacted] workers.

In addition, if no gloves are worn, dermal exposure is expected to range up to [redacted] mg/day for [redacted] workers.

F. Environmental Release #2

Disposal of [redacted] kg/yr to landfills is expected due to waste and leftovers in containers.

IV. Use

A. Process Description #1

The PMN, now totally encapsulated in a polymer matrix, will be extruded, molded, cast, etc. into various objects by [redacted] sites.

B. Worker Exposure #1

No workers are expected to be exposed.

C. Environmental Release #1

No environmental release is expected.

D. Process Description #2

The PMN dispersion will be transferred into application equipment, applied, and cured. Use will occur at [redacted] sites over [redacted] days/wk, three shifts/day for [redacted] days/yr.

E. Worker Exposure #2

A total of [redacted] workers may be exposed to the PMN chemical during transfers and application. The protective equipment/controls used by the workers is unknown. Since the PMN chemical will be in a slurry, no inhalation exposure is expected. Dermal exposure may range up to [redacted] mg/day for [redacted] workers who may come in contact with the [redacted] concentration dispersion.

F. Environmental Release #2

A release to water of [redacted] kg/site/day is expected over 25 - 250 days/year.

Summary

	Manufacture	Process #1	Use #1	Process #2	Use #2
# of sites	[redacted]				
# of worker exposed					
Protective equipment					
# of days/y					
Inhalation exposure					
Dermal exposure					
Enviro. releases					

References

[redacted] 1989. TSCA Sec. 5(a) Pre-Manufacture Notice Submission. PMN 89-867.

Orlandi, Frank. (August 7). [redacted] Baton Rouge, LA 70801. Letter submitted to L. Lambrecht.

STANDARD REVIEW: EXPOSURE REPORT PAGE 1 OF ___

CASE NUMBER(S): P-89-867

EXPOSURE EVALUATOR: REMMERS

REPORT COMPLETION DATE: 8/14/89, 8/29/89 - Addendum included.

SUBMITTER: [redacted]

IMPORT?: [ ] YES [X] NO

MAX. PRODUCTION VOLUME: [redacted]

USE(S): [redacted]

EXPOSURE(S) ASSESSED:
[ ] DRINKING GROUND WATER
[X] DRINKING SURFACE WATER
[X] INGESTION OF FISH
[X] AMBIENT AIR INHALATION
[ ] CONSUMER USE
[X] AQUATIC LIFE

SUMMARY OF ASSESSMENT:

Human Exposure due to Inhalation: [redacted]

Human Exposure to Drinking Surface Water: [redacted]

Worst case for industrial POTW SIC Code - 10th Percentile

Human Exposure to Fish Ingestion: Do not expect PMN to bioaccumulate in fish due to molecular weight too large (947).

(However, technical integrator requested the exposure values be calculated anyway: [redacted] mg/yr)

The level of concern for aquatic life is 0.1 ppb - This level would be exceeded [redacted]

Worst case is Industrial POTW SIC Code.

EED recommends testing for the formation of dioxins and dibenzofurans during incineration of the end use products containing the PMN substance

[redacted]

CASE NUMBER(S): P-89-867

CHEMICAL NAME: [redacted]

CHEMICAL STRUCTURE:

[redacted]

PHYSICAL/CHEMICAL PROPERTIES (AT 25°C) RELEVANT TO THE ASSESSMENT:

PROPERTY	VALUE(UNITS)	MEASURED VS ESTIMATED
Water solubility	[redacted] ppb	[ ]M [X]E
LogBCF	> [redacted]	[ ]M [X]E
Log KOW	[redacted]	[ ]M [X]E
MW	[redacted]	[X]M calc'd. [X]E
		[ ]M [ ]E
		[ ]M [ ]E
		[ ]M [ ]E
		[ ]M [ ]E

[redacted]

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Case Number(s): P-89-867

ENVIRONMENTAL RELEASES

Release ID#: 1
Release Activity: [X] MFG [ ] PRO [ ] IND USE [ ] COMM USE [ ] CONS USE

Number of Release Sites: [redacted]

RELEASE MEDIUM:	WATER	LANDFILL	INCINER	LAND/INCIN	OTHER
					AIR EMISSIONS
Total Releases:	(kg/yr)	[redacted] (kg/yr)	(kg/yr)	[redacted] (kg/yr)	[redacted] (kg/yr)
Release Days/yr:					[redacted]
Per Site Release:	(kg/day)	[redacted] (kg/yr)	(kg/yr)	(kg/yr)	[redacted] (kg/day)

Remarks: air emissions from the packaging & grinding operations. Dust from packaging will be landfilled - Negligible migration to ground water - no exposures calc'd. Water from process operations & equipment cleaning - deep well injection - no exposures calc'd.

Release ID#: 2 [redacted]
Release Activity: [ ] MFG [X] PRO [ ] IND USE [ ] COMM USE [ ] CONS USE

Number of Release Sites: [redacted]

RELEASE MEDIUM:	WATER	LANDFILL	INCINER	LAND/INCIN	OTHER
Total Releases:	(kg/yr)	[redacted] (kg/yr)	(kg/yr)	(kg/yr)	(kg/yr)
Release Days/yr:					
Per Site Release:	(kg/day)	[redacted] (kg/yr)	(kg/yr)	(kg/yr)	(kg/)

Remarks: PMN will be encapsulated in plastic & landfilled - Negligible migration to groundwater - No exposures calc'd.

Release ID#: 3 [redacted] PV
Release Activity: [ ] MFG [X] PRO [ ] IND USE [ ] COMM USE [ ] CONS USE

Number of Release Sites: [redacted]

RELEASE MEDIUM:	WATER	LANDFILL	INCINER	LAND/INCIN	OTHER
Total Releases:	(kg/yr)	[redacted] (kg/yr)	(kg/yr)	(kg/yr)	(kg/yr)
Release Days/yr:					
Per Site Release:	(kg/day)	[redacted] (kg/yr)	(kg/yr)	(kg/yr)	(kg/)

Remarks: Negligible migration to groundwater - no exposures calc'd.

[redacted]

STANDARD REVIEW: EXPOSURE REPORT

Case Number(s): P-87-807

ENVIRONMENTAL RELEASES

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Release ID#: 4
Release Activity: [ ]MFG [ ]PRO [X]IND USE [ ]COMM USE [ ]CONS USE

#2 5%-PV

Number of Release Sites: [redacted]

RELEASE MEDIUM:	WATER	LANDFILL	INCINER	LAND/INCIN	OTHER
Total Releases:	(kg/yr)	(kg/yr)	(kg/yr)	(kg/yr)	(kg/yr)
Release Days/yr:	[redacted]				
Per Site Release:	(kg/day)	(kg/yr)	(kg/yr)	(kg/yr)	(kg/)

Remarks: _____

==========

Release ID#: ___
Release Activity: [ ]MFG [ ]PRO [ ]IND USE [ ]COMM USE [ ]CONS USE

Number of Release Sites: _____

RELEASE MEDIUM:	WATER	LANDFILL	INCINER	LAND/INCIN	OTHER
Total Releases:	(kg/yr)	(kg/yr)	(kg/yr)	(kg/yr)	(kg/yr)
Release Days/yr:					
Per Site Release:	(kg/day)	(kg/yr)	(kg/yr)	(kg/yr)	(kg/)

Remarks: _____

==========

Release ID#: ___
Release Activity: [ ]MFG [ ]PRO [ ]IND USE [ ]COMM USE [ ]CONS USE

Number of Release Sites: _____

RELEASE MEDIUM:	WATER	LANDFILL	INCINER	LAND/INCIN	OTHER
Total Releases:	(kg/yr)	(kg/yr)	(kg/yr)	(kg/yr)	(kg/yr)
Release Days/yr:					
Per Site Release:	(kg/day)	(kg/yr)	(kg/yr)	(kg/yr)	(kg/)

Remarks: _____

[redacted]

CASE NUMBER(S): P-87-807

INHALATION EXPOSURES DUE TO POINT SOURCE RELEASES

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RELEASE ACTIVITY: [X]MFG [ ]PRO [ ]IND USE [ ]COMM USE

RELEASE DESCRIPTION: air emissions from packaging & grinding operations

NUMBER OF RELEASE SITES: [redacted]

RELEASE (KG/SITE/YR): [redacted]

(BEFORE TREATMENT) (AFTER TREATMENT)

RELEASE DAYS/SITE/YR (IF KNOWN): [redacted]

MAXIMUM INDIVIDUAL EXPOSURE (MG/YR): [redacted]

REMARKS: Generic Turner Method. ug/yr = (release after treatment) [redacted]
assumes release height of [redacted] meters and downwind receptor at 100 meters.

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[redacted]

STANDARD REVIEW: EXPOSURE REPORT Page 1 of 2

Case Number(s): P-89-867

SIC CODE-BASED AQUATIC & HUMAN EXPOSURE TO SURFACE WATER RELEASES

Release ID#: 4

Release Activity: [ ]MFG [ ]PRO [X]IND USE [ ]COMM USE [ ]CONS USE

Release Activity SIC Code(s): 2891

Release Description: Adhesives and Sealants Manuf.

Release (kg/site/day): [redacted] (before treatment) [redacted] (after treatment)

Release days/yr: [redacted]50

PLANT TYPE	% TILE	STREAMFLOW (MLD) mean	STREAMFLOW (MLD) low	STREAM CONC. (UG/L) mean	STREAM CONC. (UG/L) low	HUMAN EXPOSURE* (MG/YR) water	HUMAN EXPOSURE* (MG/YR) fish
All	50	2991	265	0.01	0.08	0.00	—
All	10	260	37.6	0.08	0.53	0.04	—
All	__	NA	NA	NA	NA	NA	
Direct	50						
Direct	10						
Direct	__						
Indirect	50						
Indirect	10						
Indirect	__						

*Where STREAM CONC = [(release after treatment) X (1000)] / (streamflow)
DRINKING WATER EXP = (mean stream conc) X (2l/day) X (release days/yr) X (0.001)
FISH INGESTION EXP = (mean stream conc) X (BCF) X (16.9 g fish/day) X (release days/yr) X (10E-6)

Remarks: Assumed 90% removal in WWT
Do not expect PMN to bioaccum. in fish -- MW too large (947)
otherwise - exposure to fish ingestion would be: 50th percentile [redacted]
10th percentile [redacted]

1 CFS = 2.4465 MLD 1 MGD = 3.7854 MLD

STANDARD REVIEW: EXPOSURE REPORT Page 1 of 12

Case Number(s) : P-84-867

PDM3 Results for Facility in Adhesives and Sealants (2891)

Release ID# : 4

Release Activity: [ ]MFG [ ]PRO [X]IND USE [ ]COMM USE [ ]CONS

Facility Name :

Facility Location:

Receiving Stream Name:

Facility on Reach? [ ]yes [ ]no

Discharge Type : [ ]direct [ ]indirect

NPDES Permit #:

Release Days/yr :
Loading (kg/site/day) : [redacted]

Conc. of concern (ug/l)	Percent of year exceeded	Days/year exceeded
0.10000	[redacted]	[redacted]
0.01000		
1.00000		

Case Number(s): P-89-867

SIC CODE-BASED AQUATIC & HUMAN EXPOSURE TO SURFACE WATER RELEASES

Release ID#: 4

Release Activity: [ ]MFG [ ]PRO [X]IND USE [ ]COMM USE [ ]CONS USE

Release Activity SIC Code(s): 2821, 2823, 2824

Release Description: Plastic Resins & Synthetic Fiber Manufacture

Release (kg/site/day): [redacted] (before treatment) [redacted] (after treatment)

Release days/yr: [redacted]

PLANT TYPE	% TILE	STREAMFLOW (MLD) mean	STREAMFLOW (MLD) low	STREAM CONC. (UG/L) mean	STREAM CONC. (UG/L) low	HUMAN EXPOSURE* (MG/YR) water	HUMAN EXPOSURE* (MG/YR) fish
All	50	2436	223	0.01	0.09	0.00	
All	10	140	10.9	0.14	1.83	0.07	
All		NA	NA	NA	NA	NA	
Direct	50						
Direct	10						
Direct							
Indirect	50						
Indirect	10						
Indirect							

*Where, STREAM CONC = [(release after treatment) X (1000)] / (streamflow)
DRINKING WATER EXP = (mean stream conc) X (2l/day) X (release days/yr) X (0.001)
FISH INGESTION EXP = (mean stream conc) X (BCF) X (16.9 g fish/day) X (release days/yr) X (10E-6)

Remarks: Assumed 90% removal in WWT
Do not expect PMN to bioaccum. in fish -- MW too large [redacted]
Otherwise - Exposure to fish ingestion would be: 50th Percentile [redacted]
1st Percentile [redacted]

1 CFS = 2.4465 MLD 1 MGD = 3.7854 MLD

STANDARD REVIEW: EXPOSURE REPORT Page ___ of ___

Case Number(s) : P-89-867

PDM3 Results for Facility in Plstc Resins & Synth Fibers(2821,23,24)

Release ID# : 4

Release Activity: [ ]MFG [ ]PRO [X]IND USE [ ]COMM USE [ ]CONS

Facility Name : _____

Facility Location: _____

Receiving Stream Name: _____

Facility on Reach? [ ]yes [ ]no

Discharge Type : [ ]direct [ ]indirect

NPDES Permit #: _____

Release Days/yr :
Loading (kg/site/day) : [redacted]

Conc. of concern (ug/l)	Percent of year exceeded	Days/year exceeded
0.10000	[redacted]	[redacted]
0.01000		
1.00000		

Case Number(s): P-89-867

SIC CODE-BASED AQUATIC & HUMAN EXPOSURE TO SURFACE WATER RELEASES

Release ID#: 4

Release Activity: [ ]MFG [ ]PRO [X]IND USE [ ]COMM USE [ ]CONS USE

Release Activity SIC Code(s): 4952

Release Description: POTW (Indust., includes POTWs which receive ind. disc

Release (kg/site/day): [redacted] (before treatment) [redacted] (after treatment)

Release days/yr: [redacted]0

PLANT TYPE	% TILE	STREAMFLOW (MLD) mean	STREAMFLOW (MLD) low	STREAM CONC. (UG/L) mean	STREAM CONC. (UG/L) low	HUMAN EXPOSURE* (MG/YR) water	HUMAN EXPOSURE* (MG/YR) fish
All	50	756	78.2	0.03	0.26	0.01	—
All	10	116	7.34	0.17	2.72	0.09	—
All		NA	NA	NA	NA	NA	
Direct	50						
Direct	10						
Direct							
Indirect	50						
Indirect	10						
Indirect							

*Where, STREAM CONC = [(release after treatment) X (1000)] / (streamflow)
DRINKING WATER EXP = (mean stream conc) X (21/day) X (release days/yr) X (0.001)
FISH INGESTION EXP = (mean stream conc) X (BCF) X (16.9 g fish/day) X (release days/yr) X (10E-6)

Remarks: Assumed 90% removal in WWT
Do not expect PMN to bioaccum. in fish -- MW too large ([redacted])
Otherwise - Exposure to fish ingestion would be: 5th Percentile 3.5 mg/yr
10th Percentile 23.8 mg/yr.

1 CFS = 2.4465 MLD 1 MGD = 3.7854 MLD

Case Number(s) : P-89-867

PDM3 Results for Facility in POTW (Industrial) (4952)

Release ID# : 4

Release Activity: [ ]MFG [ ]PRO [X]IND USE [ ]COMM USE [ ]CONS

Facility Name :

Facility Location:

Receiving Stream Name:

Facility on Reach? [ ]yes [ ]no

Discharge Type : [ ]direct [ ]indirect

NPDES Permit #:

Release Days/yr :
Loading (kg/site/day) : [redacted]

Conc. of concern (ug/l)	Percent of year exceeded	Days/year exceeded
0.10000	[redacted]	[redacted]
0.01000		
1.00000		

CASE NUMBER(S): P 89-867

REMARKS:

Based on a conversation with Asa Liefer -

There is no data to support his claim, but he speculates that in the environment - either air or water - that one or two of the bromines on the PMN will be replaced with -OH groups. After that the replacements of bromine will be less likely. Also, it is not likely to be replaced with hydrogen since in the environment it is usually aerobic conditions.

8/29/89 Addendum:

As a result of the EED Disposition Meeting on 8/29/89 the following testing is recommended:

Tony Glatz - who was present at the EED Disp. meeting - thinks that it is possible that dioxins and dibenzofurans could be formed during incineration of the end use products (containing the PMN fire retardant) as a result of disposal. Therefore, it is recommended that testing be required for the formation of dioxins/dibenzofurans as a result of incineration.

[redacted]